

# Study and Restoration of the Zeyrek Camii in Istanbul

## *Second Report, 2001–2005*

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*In memory of A. H. S. Megaw (1910–2006)*

The Zeyrek Camii in Istanbul represents the largest and most significant monument in the city to survive from the middle Byzantine period. Built originally ca. 1118–36 by John II Komnenos and his wife Eirene as three large, interconnected churches, the complex served as the core of the famed Pantokrator Monastery, an important site of Christian veneration, and as an imperial mausoleum, housing more than a dozen tombs of the rulers of an empire (figs. 1–2).<sup>1</sup> The Pantokrator also played a key role during the Latin Occupation (1204–61), when it served as headquarters for the Venetians, as well as during the Ottoman

transformation of Constantinople following the conquest in 1453, when it was converted to a mosque.

Although neglected in the twentieth century, the Zeyrek Camii has retained its striking appearance: three great buildings side by side, topped by undulating vaults and five distinctive domes, with an irregular row of apses along its east façade, all decorated with niches and intricate brickwork. Stylistically, the building marks a critical point in the development of Byzantine architecture, as it shifts from monumentality toward complexity as the primary mode of visual expression.

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1 W. Müller-Wiener, *Bildlexikon zur Topographie Istanbuls* (Tübingen, 1978), 209–15, with extensive bibliography; A. Van Millingen, *Byzantine Churches in Constantinople: Their History and Architecture* (London, 1912), 219–40; also R. Janin, *La géographie ecclésiastique de l'empire byzantin* (Paris, 1969), 1.3:515–23, for a survey of the sources. For additional architectural drawings, see J. Ebersolt and A. Thiers, *Les églises de Constantinople* (Paris, 1913), 171–207.

### Documentation and Restoration

The survey of the building complex was begun in 1995–96, anticipating the possibility of a major project of study, documentation, and restoration. With the permission of the General Directorate of Pious Foundations (Vakıflar Genel Müdürlüğü), we began the restoration in 1997–98. The results of this first period of intervention were summarized in our first report.<sup>2</sup> The building was subsequently listed on the World Monuments Watch list of endangered sites of world culture in 2000. Unfortunately, with political

2 R. Ousterhout, Z. Ahunbay, and M. Ahunbay, “Study and Restoration of the Zeyrek Camii in Istanbul: First Report, 1997–98,” *DOP* 54 (2000): 265–70; M. and Z. Ahunbay, “Restoration Work at the Zeyrek Camii, 1997–1998,” in *Byzantine Constantinople: Monuments, Topography, and Everyday Life*, ed. N. Necipoğlu (Leiden, 2001), 117–32.



FIG. 1 Istanbul, Zeyrek Camii, general view from the east, following completion of program (June 2006)

changes in Turkey, work was halted from 1998 until late summer of 2001, although our efforts at documentation continued. After 2001, the restoration work continued into the winter of 2005–6. With the official completion of the 2005 season, however, the Vakıflar Genel Müdürlüğü assumed responsibility for the funding and oversight of the restoration, and our involvement with the project ended. Despite the change in management, we believe we have realized our initial goal of rescuing a major historic monument from oblivion.

Our restoration efforts concentrated on the exterior, on addressing the most urgent structural concerns of the building, and on securing it against man and the elements.<sup>3</sup> This work included systematically removing all the weighty and leaking concrete roofs and replacing

them with more historically accurate lead sheeting laid over a bedding of clay; replacing the deteriorating and broken windows and window frames; and restoring damaged areas of the brick façades.

When our work was halted in 1998, the five domes, the high vaults, and south gallery of the south church had been reroofed. Several other areas of the eastern and western roofs had been stripped of their modern concrete covering and prepared with clay beddings, but the lead sheeting had not yet been put into place. As a consequence, when we were allowed to begin again in 2001, it was necessary to clean the exposed areas of vaulting to remove large quantities of weeds and to redo the preparation for the lead covering.

Before the lead sheets could be laid, the damaged greenstone cornices of the apse façades had to be repaired or reconstructed so that the lead sheets could be properly anchored at the edges. We reconstructed the original profiles of the Ottoman greenstone cornices, forming them in situ with a mortar mixture that included crushed greenstone as the aggregate; we left

3 For the limited excavations, see A. H. S. Megaw, "Notes on the Recent Work of the Byzantine Institute in Istanbul," *DOP* 17 (1963): 333–64. For the *opus sectile*, see also R. Ousterhout, "Architecture, Art, and Komnenian Ideology at the Pantokrator Monastery," in Necipoğlu, *Byzantine Constantinople*, 133–50.

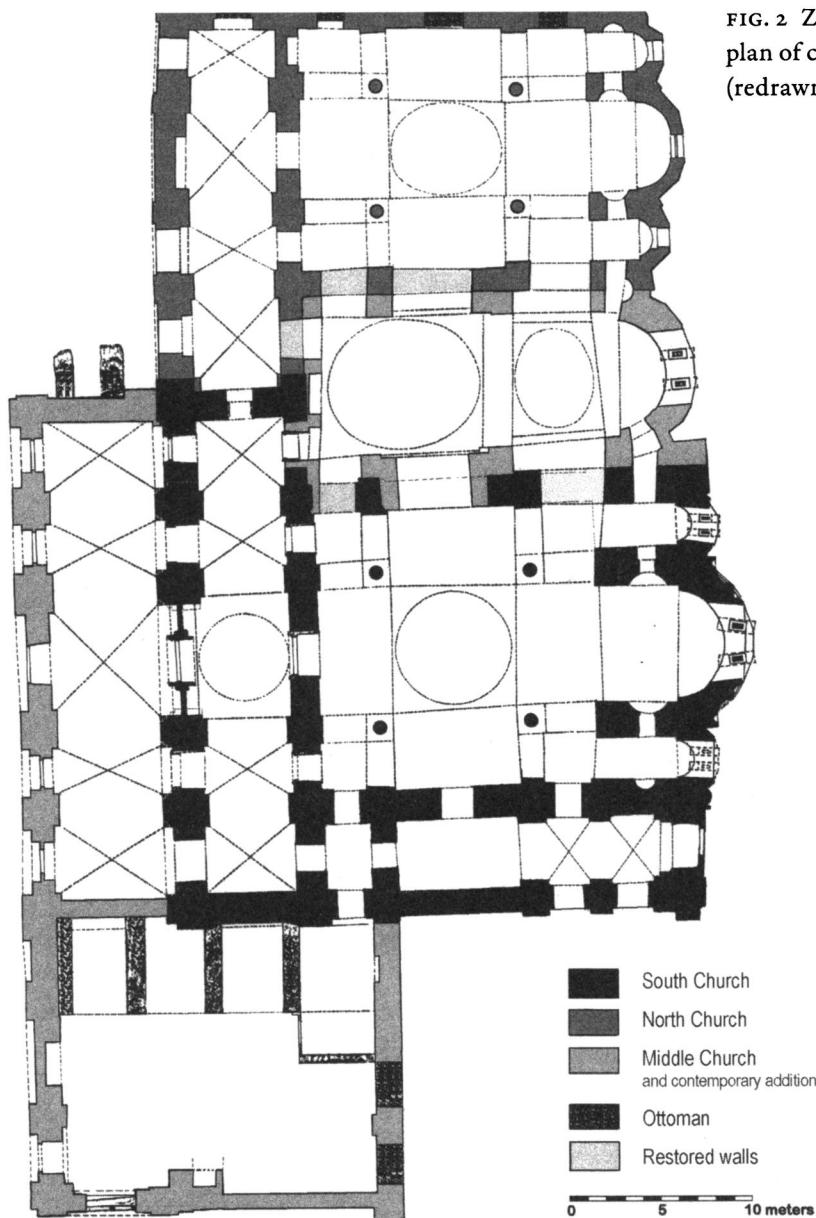


FIG. 2 Zeyrek Camii,  
plan of complex  
(redrawn after Megaw)

several of the better-preserved original cornice blocks exposed. In addition, the roof level above the southeast corner of the north church had been raised with a dirt-and-rubble fill, and this had to be lowered before a new surface could be established. The base of the east central dome proved to be quite irregular in shape. We completed the work on the eastern vaults and the conches of the apses during the 2002 season (fig. 3).

The cleaning of the roof level above the curious block of masonry between the south and middle churches exposed a blocked window opening into the prothesis of the south church (see fig. 1, above the left-most column). We restored its stepped arch. Within the window opening we found a rough fill of mortared rubble, which had been packed from the interior; cavities were preserved from both the late Ottoman window frame and a Byzantine tie beam. The northern surface



FIG. 3 Zeyrek Camii, east roofs, looking north; workers install glass into new window frames of east central dome (July 2003)

of the block of masonry represents a continuation of the recessed brick masonry of the middle church apse, broken at its eastern extreme and repaired, with the east face of the block resurfaced in the Ottoman period (see fig. 1). The initial purpose of this buttress-like construction remains unclear.

Before recovering the areas of roof along the eastern side of the middle church, it was necessary to expose and repair some of the adjacent areas of wall surface. These had been damaged and repaired in the Ottoman period, after much of the original surface had broken away; the last restoration had covered them with a thick layer of concrete. We resurfaced the crossarm façades of the north and south churches, using a lime mortar consistent with the original Byzantine mortar (as we have done throughout our interventions). The characteristic light pink color is caused by the mix of brick powder and brick debris with the lime mortar. New bricks were manufactured to correspond to the

sizes of the Byzantine bricks, and these were used in the restoration when the original surface had been destroyed. Because the Byzantine complex was constructed in the recessed-brick technique, the surfaces have a distinctive striped appearance of thin bricks and broad mortar beds.

In 2003, we completed the documentation of the entire east façade and adjacent surfaces of the complex (fig. 4). The stone-by-stone drawings were coded according to material and condition. Based on this information, we presented a detailed restoration proposal, and funding given through UNESCO allowed for the restoration of the east façades of the north and middle churches. Work in these areas began in 2004 and was completed in 2005 (figs. 1 and 5).

While the scaffolding was in place in 2001, we cleaned several areas of the east façade to expose the original Byzantine surfaces in order to determine the proper finished appearance for the repointing. Exposed



FIG. 4 Zeyrek Camii, measured drawing of east façades (2003, Z. and M. Ahunbay)

areas show brick and stone courses laid with a thick application of mortar, with the mortar beds etched to outline the bricks, occasionally set in zigzag or decorative patterns. Although it is now apparent from our examination of the building that all the façades were originally covered with plaster, we decided to leave the brick surfaces exposed in the restoration. These have become quite familiar to visitors over the years, and they are also important for representing the history of the building.<sup>4</sup>

As we investigated and repaired different areas of the building, we took the measurements for the fabrication of new frames for the window openings in the

upper walls and domes. We replaced more than sixty of the upper windows and attempted to regularize the size and appearance of the windows within each area. None of the original window frames was preserved, and we have given the new windows a simple late Ottoman form fabricated in white concrete, with the exception of the large east windows to be discussed below.

During 2002, we repaired the upper areas of the north church. The vault and windows of the west crossarm had been broken and repaired in the late Ottoman period, giving the façade arch a slightly pointed profile and raising the crown of the central window (fig. 6, left side). The restoration stabilized the masonry while leaving visible the evidence of historical changes. The north and south crossarm vaults were covered with lead sheeting in 2003.

The remaining reinforced concrete roofs over the western part of the complex were removed late in the 2002 season, and our work during 2003 concentrated in

<sup>4</sup> A similar decision was made with the recent wall repairs at Hagia Sophia. For an assessment of Byzantine façade treatments, see S. Ćurčić, *Middle Byzantine Architecture on Cyprus: Provincial or Regional?* 13th Annual Lecture on the History and Archaeology of Cyprus (Nicosia, 2000), 21–30.



FIG. 5 Zeyrek Camii, detail of east façades of central and north churches after the installation of marble window frames (August 2005)

this area. Part of the restoration of the 1960s, the high, sloping roof did not reflect the historical form of the building; it had been raised and simplified, obscuring a variety of irregular surfaces and partially or completely blocking numerous windows. The oddly positioned concrete piers supporting the roof had punctured the vaults; in addition, the gallery vaults had been repeatedly damaged (probably by earthquake) and inadequately repaired. To compound problems, the façade surfaces beneath the concrete roof had been hacked back, and the drum base of the west central dome had been severely damaged. The reasons behind this destruction are not clear, although they include earthquakes and long periods of exposure to frost.

Within the exposed areas, the three major components of Byzantine construction converge. Because the Byzantine funeral chapel (middle church) had been sandwiched between the north and south churches in the twelfth century, its plan is irregular, and the irregularities extend to the level of the vaulting. Both domes are oval in plan, rising above irregular bases. The western dome base, which intersected the gallery vaults of the north and south churches, was asymmetrical and irregular, often sloppy in its execution, which complicated the process of restoration. As we cleaned the upper surface of the dome base, we were able to record the double row of cavities from the system of wooden reinforcement beams within the thickness of

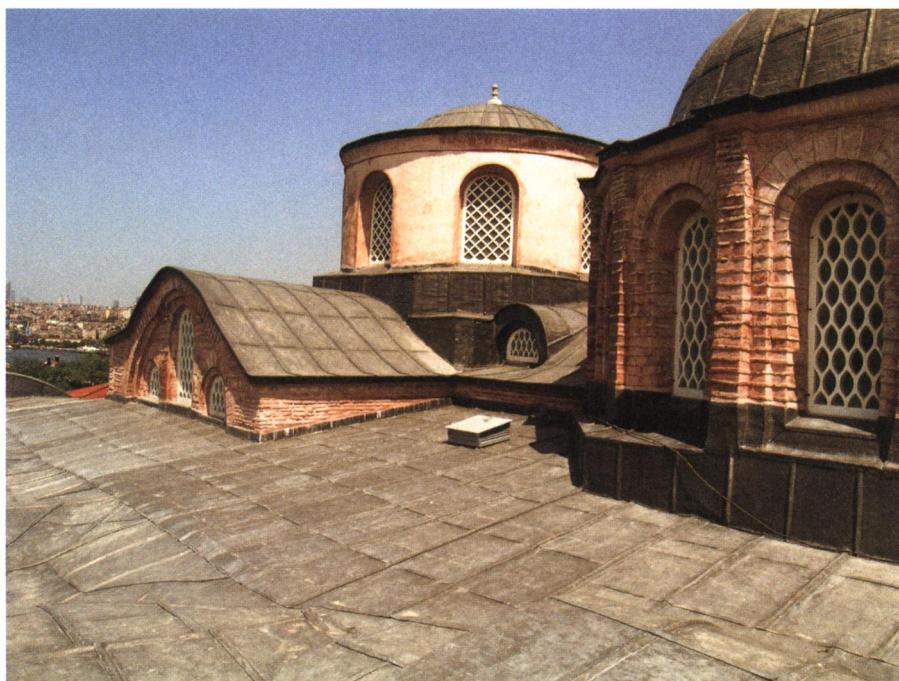


FIG. 6 Zeyrek Camii, roof of the north gallery completed, looking northeast, with the western crossarm of the north church to the left (June 2004)

the masonry, extending around the dome at the base of the drum (fig. 7). During the restoration of this area, we restored the system of wooden reinforcement on the advice of our structural engineer, Professor Feridun Çili.

When the funeral chapel was added in the twelfth century, the vaults of the low corner bays of the north and south churches became awkward depressions in the middle of the roof system, boxed in by the west central dome base and the gallery vaults. A raised roof level would have become necessary to facilitate the drainage of rainwater from these areas. There is no evidence of additional vaulting over the corner bays, and these areas were more likely covered by sloping wooden roofs. Unfortunately, evidence for the roofline disappeared in later restorations, with the destruction of surface masonry on the adjacent façades. We covered these areas with low, sloping roofs built of treated wood, with a felt cushion added before the lead sheeting was put into place.

As completed, the roofline now follows more closely the changes in levels between the various parts of the building, stepping down from the crossarms to the corner bays and narthex roofs. The north church included small windows set in the barrel vault

penetration of the south crossarm. These had been entirely concealed by the concrete roof but are now exposed. In addition, the windowsills of the west central dome had been blocked to different heights to match the slope of the modern concrete roof, and some of the windows had been entirely suppressed. During the 2003 season, we were able to regularize the window openings, establishing a standard sill level, with windows measuring approximately 100 cm wide by 230 cm tall. In cleaning the window sills, we discovered that they had been raised already in an earlier restoration, perhaps of the eighteenth century, and from these areas we recovered a variety of Byzantine materials, including hundreds of mosaic tesserae—some still affixed to setting plaster—as well as fragments of architectural sculpture and other pieces of marble.

Much of our energies in 2003 concentrated on stabilizing the gallery vaults. These suffered from a variety of earthquake fractures and other damage, and in many areas the Byzantine mortar had disintegrated. Our standard procedure was to clean the external surfaces of the vault to expose the masonry, to remove all loose rubble and mortar, and then to repoint and replace the bricks and mortar as necessary before applying a layer of lime mortar over the entire vault to consolidate it. In

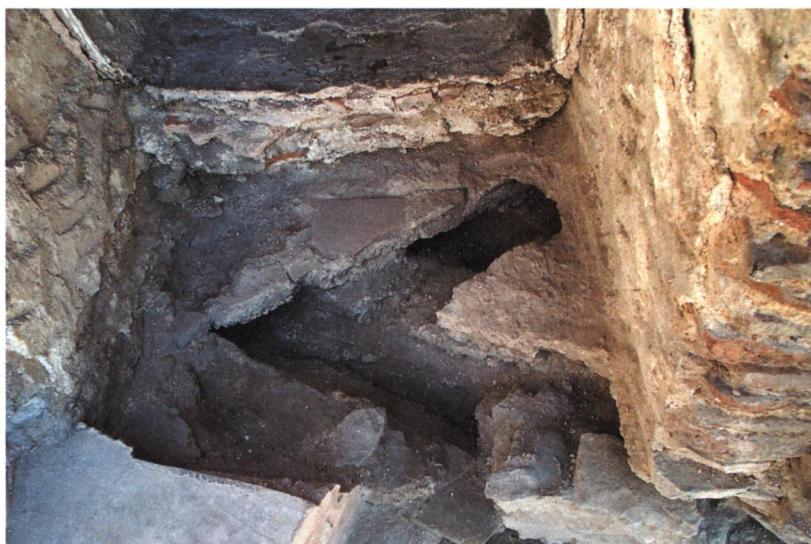


FIG. 7 Zeyrek Camii, window reveal of the west central dome, showing the cavities for reinforcement beams at its base (July 2003)

the final stage, the mortar was overlaid with a layer of clay mixed with straw, and then the lead sheeting was put into place.

Throughout the gallery vaults, we found evidence of earlier interventions. Many of the vaults had been “repaired,” apparently after the great earthquakes of 1766 and 1894, by pouring either gypsum or molten lead into the cracks, and we extracted quantities of lead during the cleaning of the vaults. In most instances, it was necessary to stitch the cracks back together by inserting connector bricks that extended across the fracture, so that the vault could once again function structurally as a monolithic whole. With the exception of a hole cut to insert a chimney in the late Ottoman period, the south gallery vault was in relatively good condition. The vaults measured just under 40 cm thick—that is, the length of a standard Byzantine brick.

The north gallery had been shattered and badly repaired over the centuries, and it demanded greater attention. Much of the crown of the vaults proved to be of newer materials from the 1960s intervention, executed in modern brick and concrete. To remove the modern repairs was impossible; they remained as they were and were stitched to the original vault with connector bricks. In several areas where the vaults were broken or in danger of collapse, it was necessary to work simultaneously from the interior and exterior. We constructed bracing in the north gallery to support the vaults through the process. The stability of the

north gallery vault was further threatened by a large crack running along its west side, at the line where it joins to the west façade. This was stitched together in the areas where it was exposed. However, the sagging of the vaults, probably compounded by earthquake damage, has pushed the west façade outward, so that it leans noticeably to the west.

With the removal of the concrete roof, a change in level became apparent where the north gallery joins the south gallery. The south gallery rises more than 60 cm higher, but its façade arcade had been broken away at the joint, where the north gallery vault had been built up. It is not clear when this occurred, but it appears that the distinction between the two buildings was more evident in the Byzantine period than it is today. The stepped arcade of the south gallery still preserved areas of its original surface plaster at the connection. The north church was apparently built abutting the south church at the narthex and gallery, but without bonding, and the original façade plaster of the south church was left intact.<sup>5</sup>

A similar area of surface plaster remained in place on the east face of the northernmost bay of the south gallery, where it was abutted by the base of the

<sup>5</sup> Megaw, “Recent Work,” 344, notes similar connections at the ground level; R. Ousterhout, “Contextualizing the Later Churches of Constantinople: Suggested Methodologies and a Few Examples,” *DOP* 54 (2000): 241–50, esp. 248 and figs. 12–13.



FIG. 8 Zeyrek Camii, the connection between the northernmost bay of the south gallery, left, and the vaulting of the central chapel, right, looking northwest; this area is now covered by a wooden roof, as it undoubtedly was in the Byzantine period (June 2003)

west central dome when the funeral chapel was added (fig. 8). The three-stepped arch has an outermost layer of pinkish plaster, with crushed brick mixed into the mortar. Both of these areas had already been examined while the concrete roof was in place, but the relationships of the different components of the building are now considerably easier to comprehend.<sup>6</sup>

The same systematic approach was applied during the 2004 season to the exonarthex roof, where we

<sup>6</sup> Ousterhout, "Contextualizing," 248–49, fig. 13; see also idem, "Interpreting the Construction History of the Zeyrek Camii in Istanbul (Monastery of Christ Pantokrator)," in *Studies in Ancient Structures: Proceedings of the Second International Conference* (Istanbul, 2001), 1:19–27.

encountered a similarly heavy and intrusive concrete covering, as well as a similar history of damage and repair (fig. 9, left side). Once the concrete roof was removed, we mended a series of cracks in the vaults along the west façade of the building. Here the vaults had settled, probably compounded by earthquake movement, and the façade wall had rotated slightly outward. As in the past, the cracks were stitched together by inserting new bricks to join one side of the break to the other. We also regularized several areas of fill (at the corners of the vaults) to facilitate drainage. The north façade of the exonarthex was also repaired and its eaves regularized in preparation for the new roof. Before the lead sheeting was applied, the vaults were covered with a cap of lime mortar, and a low wooden roof was constructed over them, similar to the system applied to the north gallery roofs.

The removal of the concrete roof from the exonarthex exposed large areas of the original west façade of the south gallery and thus gives us a better idea of the original window system of the building (fig. 10). In the lateral windows, for example, we exposed the traces of marble columns and capitals. The new roof is about a meter lower than the former concrete roof, corresponding to the original exonarthex roof level. The transformation of the central arcade for the construction of the gallery dome was also clarified (fig. 11).<sup>7</sup>

Our efforts in 2005 concentrated on the east façades of the north and middle churches, completing work begun in 2004, supported by UNESCO (see fig. 5). This provided a dramatic transformation in the outward appearance of the building where it is most visible. The central light of each of the main apse windows was opened to its full height, and the pastophoria windows of the north church were also rebuilt. For these tall windows, 8-cm-thick marble window frames were cut and put in place to increase the stability of the façade. It was not possible to open the lateral lights of the north apse triple window because of their height (over 7 m) and the damage they have suffered. Both mullions exhibited vertical cracks running their entire height, and the bases and capitals had been severely damaged. At some time in the future, it may be possible to open the lateral lights of the middle church triple window, but they were not included in our program for 2005.

<sup>7</sup> As noted in Ousterhout, "Contextualizing," 249 and fig. 16.

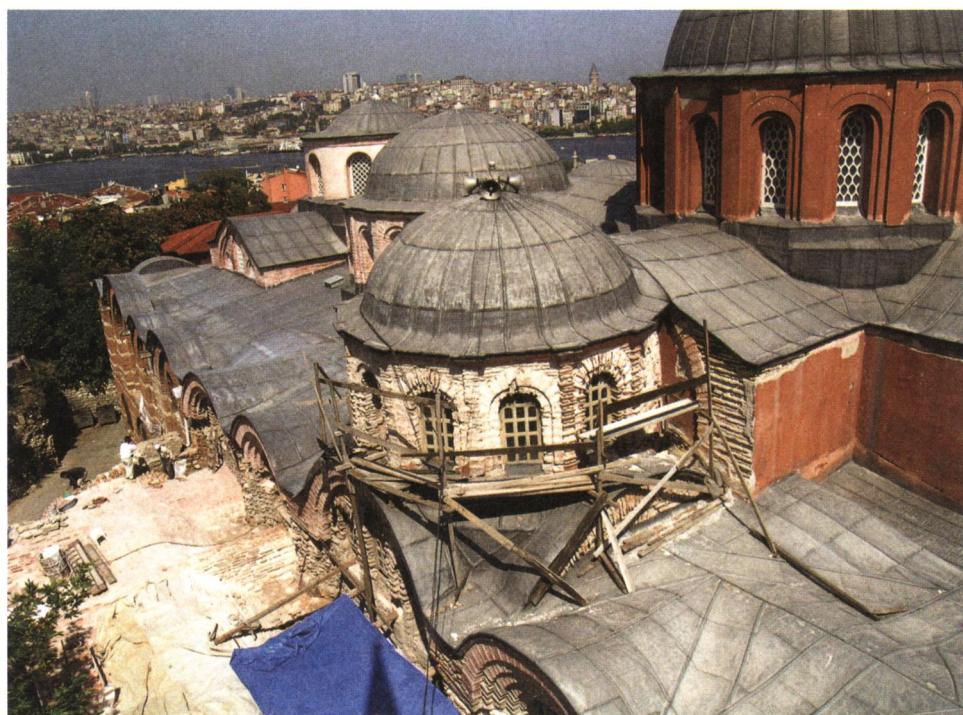


FIG. 9. Zeyrek Camii, view from the minaret, looking northeast, after the completion of the upper roofs and with work on the exonarthex roof (left) in progress (July 2004)

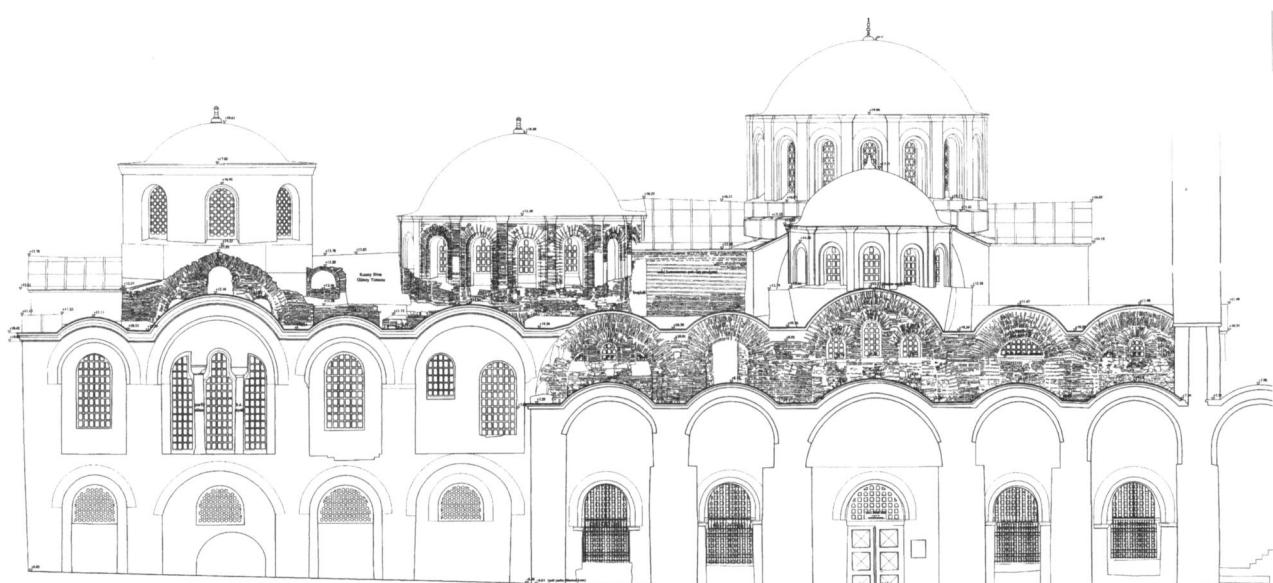


FIG. 10. Zeyrek Camii, measured drawing of the western façades (2005, Z. and M. Ahunbay)



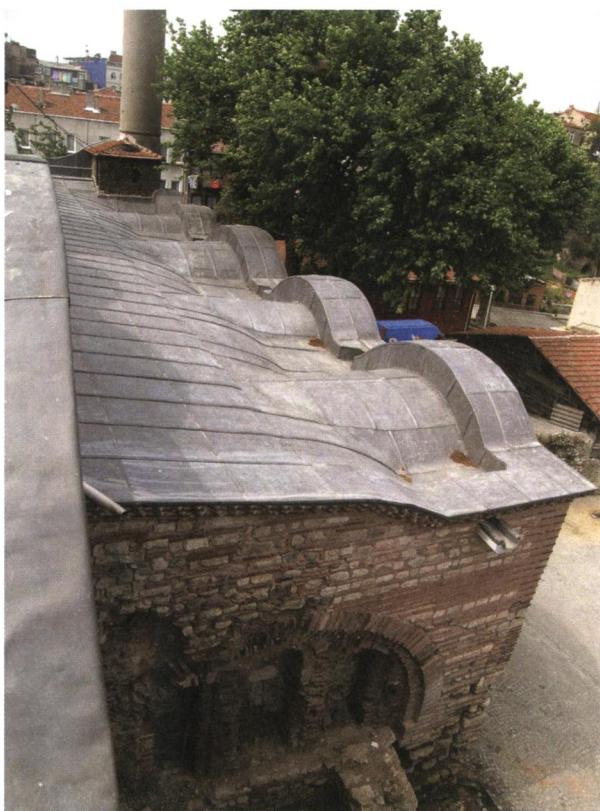
FIG. 11 Zeyrek Camii, central arcade of south gallery, looking east, after removal of concrete roof (July 2004)

The windows of the north church pastophoria required heavy restoration as they had been altered after earthquake damage. Both were set asymmetrically and flare toward the interior, and the inner faces of the arches are cut by the curvatures of the apses. They were irregularly constructed from the beginning, with the diakonikon window rising ca. 68 cm higher than that of the prothesis. Moreover, the marble cornices at the imposts of the prothesis were set at different heights. The wall beneath the prothesis window had been cut back to floor level in the Ottoman period and required rebuilding. In cleaning the external surface for reconstructing the wall, we encountered the foundation of the prothesis at roughly the original floor level. The foundation is semicircular on the exterior, whereas the rising wall above it is polygonal (fig. 12).

The lower portions of all the apses had been cut back on their exteriors and required reconstruction. In addition, the cornices, bases, and all but one of the capitals had been cut back. The capitals and bases were remodeled in place by sculptors working with white cement mixed with crushed marble and marble powder. New marble cornices were cut for the windows.



FIG. 12 Zeyrek Camii, foundation of the prothesis of the north church looking down (June 2005)



Beginning in 2004 and continuing into the subsequent season, the north façade of the exonarthex was restored (figs. 13–14). Although its interior surface remained well preserved, the exterior facing had been severely damaged, and the tripartite window had been blocked, probably when a late Ottoman house was built against it. With the cleaning of the surface, evidence began to appear for changes effected during the Byzantine period, including the raising of the roofline and strengthening with thick pilasters along the west façade. When the window lights were opened, evidence of the Byzantine fresco decoration also appeared.

### Interior decoration

As we worked in the areas around the windows and particularly in the apses of the north and middle churches, a variety of evidence was exposed that provided new information for the interior decoration of the building. The lavish character of the original interior was emphasized by these discoveries.

*Cornices.* Areas of red pigment, probably Armenian bole, are preserved on the interior marble cornices (figs. 15–16). Armenian bole was traditionally employed as a setting for gold leaf. Traces of gold leaf have been found on broken pieces of the upper cornice from the north church, including one now embedded in the window fill of the middle church. When the Ottoman plastering was removed from the marble cornice of the apse in the middle church in 2005, large areas of red pigment and gold leaf were exposed, although it often came away with the plaster. It would appear that all the interior cornices were covered with gold leaf.

FIG. 13 (top) Zeyrek Camii, view toward the exonarthex, looking south, following completion of roof (June 2005)

FIG. 14 (bottom) Zeyrek Camii, north façade of the exonarthex, after completion of restoration (June 2006)

*Mosaics.* Three areas of in situ mosaic decoration were identified in 2005, in the reveals of the three apse windows of the middle church. The central light was opened, and the mosaic cleaned and stabilized by conservators from the Central Conservation Laboratory of the Ministry of Culture and Tourism (fig. 17). The pattern of the mosaic, a simple rinceau executed in gold on a dark blue background, is quite similar to the exposed mosaic pattern in the north window of the north church. Areas of mosaic survive in the lateral two arches of the middle church apse window as well, but these have not yet been uncovered. The area of mosaic in the central light is preserved to a maximum width of 43 cm of a total estimated width of 48 cm; it originally covered an area ca. 168 × 48 cm. The mosaic was set

above two layers of white plaster and one layer of pink mortar, for a total thickness of 3.5 cm. The mosaic tesserae are relatively large, measuring normally between 0.8 and 1.0 cm square.

*Frescoes.* The interior of the exonarthex was decorated with fresco rather than with mosaic, and evidence of painted plaster survives in the blocked windows of the north and south walls. One of the south windows had been partially exposed near the stairs to the minaret. On the exterior, the blocked window reveals preserved traces of fresco decoration in red and white on a blue background, suggesting that this area—now part of the south courtyard (which we could not explore)—may have been interior space. With the removal of the later blockage from the north window during the fall



FIG. 15 Zeyrek Camii, middle church, apse cornice showing traces of Armenian bole and gold leaf (August 2005)



FIG. 16 Zeyrek Camii, fragment of the upper cornice from the north church with traces of Armenian bole in the field (July 2004)



FIG. 17 Zeyrek Camii, middle church, central light of apse window, mosaic after conservation (July 2005)

of 2005, the fresco decoration of the window reveals was exposed (fig. 18). The surfaces are patterned with rinceaux similar to those in the mosaics of the north and middle churches, but with more color and variety. The vine pattern has a white stem outlined in black, surrounding and enclosing fields of red, blue, and yellow.

*Evidence from the revetments.* In areas where we cleaned interior wall surfaces, we found a regular pattern of iron pins set with marble plugs, as was standard for the attachment of marble revetments. From their positions, we can begin to understand the organization of the revetments. For example, around the apse windows of the middle church, the upper lights were framed by borders ca. 12–14 cm wide, with a band ca. 20 cm wide extending under the cornice.

Within the apse of the north church, a bench had been cut into the lower wall surface, above which the wall has been hacked back and angled upward to the cornice. The bench itself seems to represent the line of the original wall surface. The lower and upper cornices do not follow the same curvature, and the lower cornice may have been reset when the wall was altered. Above the center of the bench, a semicircular niche was inserted between the window mullions, the bases of which were hacked back as the wall was altered (fig. 19). The window sill level was raised at the same time, with a new sill introduced just above the mullion bases. These changes seem to have been carried out in Byzantine times, as is indicated by the mortared surface, which was etched with lines when the mortar was damp, as



FIG. 18 Zeyrek Camii, exonarthex, windows in north wall, frescoes in reveals, after conservation (May 2006)



FIG. 19 Zeyrek Camii, north church, interior of apse showing Byzantine modifications: wall surface and mullion base cut back and niche inserted (July 2005)

was common for Byzantine masonry finishes. In addition, marble plugs and pins appear regularly, as were used in the Byzantine period to secure marble revetments. These changes may have been intended to create a synthronon in the north church apse, perhaps in the late Byzantine period.

### Small Finds

**Brickstamps.** Among the finds from the last years, we have documented more than 350 brickstamps, dating from the fourth through sixth centuries. Their presence indicates that the building materials for the twelfth-century complex are almost entirely reused. The brickstamps appeared in several formats: round with a circular inscription; round with a linear inscription; round with decoration; round with a monogram;

cruciform with inscription; cruciform without inscription; bar with single-line inscription.

Among the decipherable names on the stamps, more than half record the name AYΞΑ, probably an abbreviation for Auxentios or Auxantios, usually in a standard formula: +INIBBAAYΞΑ (indiction 12, made by Auxentios). Almost all appear in a single line on a bar-shaped stamp. The execution of the letter Ξ varies considerably. The names KOCTAN, ΠΕΤΡΟC, APICTENHTOC, TΡΟΦΙ[MOC], and BACΙΛΙOC also appear.<sup>8</sup> In the repairs to the north church prothesis, several monogram roundels with the name +ΠΑΥΛΟC+ were found.<sup>9</sup> As we have suggested in our first report, the bricks may have come from the late antique buildings that were demolished in the twelfth century to make way for the construction of the monastery.<sup>10</sup>

**Cornices and revetments.** Among the marble fragments found in the rubble are pieces of several different cornices. We uncovered several large pieces matching the cornices in the north and middle churches, which must have found their way onto the roof or into the window fill following significant damage to the building during the Ottoman period. In addition to these, we have found a variety of additional fragments of cornice blocks with simple profiles. We also located several fragments of marble revetments in at least three different colors of marble, as well as torsade moldings and pieces of rosso antico skirting (fig. 20). These correspond with pieces still in situ in the apse of the south church. A few of the revetment panels preserve curved rear surfaces, indicating that they were cut from columns, a common practice in Byzantium, as marble was not quarried after the seventh century.<sup>11</sup>

**Mosaics.** Most plentiful among the small finds are thousands of mosaic tesserae, which appear most commonly as material in the mortar from the eighteenth-century restoration (fig. 21). In the areas of rubble fill, we also found fragments of setting plaster, often with the tesserae still attached. We speculate that the

<sup>8</sup> These are quite similar to those illustrated in J. Bardill, *The Brickstamps of Constantinople* (Oxford, 2004), 2: figs. 121–36.

<sup>9</sup> These correspond to ibid., 2: fig. 1377.

<sup>10</sup> Ousterhout, Ahunbay, and Ahunbay, “Study and Restoration,” 268–69.

<sup>11</sup> See R. Ousterhout, *Master Builders of Byzantium* (Princeton, 1999), 235–39.



FIG. 20 Zeyrek Camii, torsade frames from marble revetments, found in the Ottoman fill of the middle church apse window (June 2005)

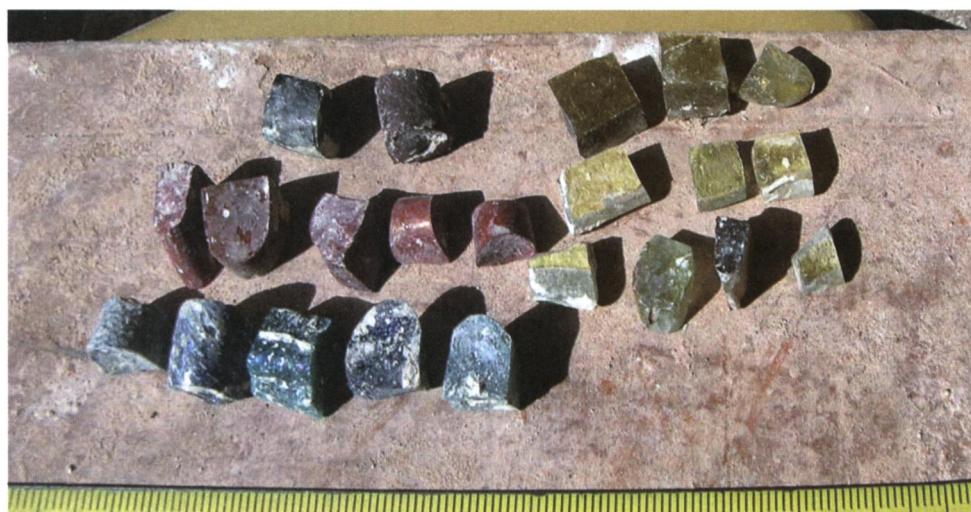


FIG. 21 Zeyrek Camii, mosaic tesserae found in the rubble fill of the Ottoman roof (August 2005)

building was severely damaged in the 1766 earthquake and thoroughly restored shortly thereafter, and that large areas of mosaic decoration fell during the earthquake and that others may have been removed during the restoration. From the observations of the tesserae, it is clear that they were cast in pans, as many pieces preserve one rounded edge. On the edge pieces of the gold tesserae, the gold leaf occasionally does not extend all the way to the outer border and is overlain by a very thin layer of glass that forms itself to the curved edge; these pieces were thus fired twice. The size of tesserae varies considerably, with the largest close to  $1.0 \times 1.0$  cm,

although they are more commonly about  $0.7 \times 0.8$ ; they vary between  $0.40$  and  $0.75$  cm thick.

*Capitals.* The fragments of capitals found as fill material in the blocked windows include pieces taken directly from the Byzantine building, older pieces of uncertain provenance, and a few Ottoman pieces. Capitals still in situ also appeared with the cleaning of the south church gallery windows. We discuss two examples here.

A fragmentary late antique capital found in the cleaning of the central apse window is of a composite type, with pronounced volutes and acanthus leaves



FIG. 22 Zeyrek Camii, fragment of a capital found in the rubble fill of the middle church apse window (June 2005)

detailed with drill holes (fig. 22). The piece measures 25.5 x 29.0 cm across its preserved upper surface by 37.0 cm tall. If complete it would have measured ca. 54 cm across at the abacus. Oddly, the preserved corner forms a 60-degree angle, and enough of it is preserved to conclude that this capital was originally three-sided and somewhat asymmetrical. From the carving, a fifth-century date may be proposed.

During the clearing of the north window in the gallery of the south church, a fragment of one of the capitals was discovered in situ, set with a sheet of lead to connect it to the column shaft beneath it (fig. 23). The capital has a fillet above a cavetto, with a setback to a second fillet, before the outer field, which is covered with a palmette pattern, with a pinecone-like bud at the corner. The lateral surface is undecorated. It measures ca. 32 cm high by 100 deep, with about 21 cm of its width preserved, from an estimated overall width of 76 cm. The column shaft below has a diameter of ca. 30 cm, so the capital flared dramatically above it. It seems

likely that the capital was carved specifically for the building, as similar details appear in other fragmentary capitals found in the building, and the combination of the palmette pattern and pinecone-like bud is found in situ at the corners of the lower cornice of the north church. A very similar capital appears among the reused pieces in the gallery of San Marco in Venice—perhaps a Venetian spoil from the Pantokrator.<sup>12</sup>

### Construction History

The general outline of the Pantokrator's history is well known, following the crucial examination of the

12 F.W. Deichmann, J. Kramer, and U. Peschlow, *Corpus der Kapitelle der Kirche von San Marco zu Venedig*, Forchungen zur Kunstgeschichte und Christlichen Archäologie 12 (Wiesbaden, 1981), 132, no. 607; pl. 44; the authors tentatively date the capital to the 13th century.



FIG. 23 Zeyrek Camii, fragment of capital still in situ, north window of the south church gallery (July 2004)

building by A. H. S. Megaw, published in 1963.<sup>13</sup> Three churches were built side by side in rapid succession between ca. 1118 and 1136. The south church, dedicated to Christ Pantokrator, was the katholikon of the monastery; the north, dedicated to the Virgin Eleousa, served the lay community, and the middle, dedicated to St. Michael, functioned as the imperial mausoleum. The standard interpretation maintains that the three churches represent three distinct phases of construction, but our recent examination of the building allows numerous refinements to the chronology. The south church was brought to completion before the other two churches were envisioned, but the later two construction "phases" actually represent a continuous period of building activity, replete with modifications, enlargements, and alterations that were effected only when the

13 Megaw, "Recent Work," esp. 343–44.

construction was well underway. That is to say, rather than representing separate processes, the design and construction occurred simultaneously. In 2000, we presented some initial observations on the chronology of the building, which we can now update.<sup>14</sup>

It is clear that the south church was completed and plastered on the exterior before the second phase was begun. Both later periods of addition abut the pink plaster surfaces of the first phase, which were left intact. Evidence of the external plaster is visible where the narthex galleries of the south and north churches join, where the dome of the middle church abuts the south narthex gallery, and where the dome over the south church gallery abuts the western crossarm of the naos.

After the completion of the south church, the north church was begun as a freestanding element, connected only by the doorway from the narthex, as well as on the gallery level. Here an extra bay in the north narthex and gallery served as the connector, and we may presume an open space between the two churches east of this. In this configuration, the north church would have appeared as a smaller, simpler version of the south church. Visually it would have read as an independent entity.

At the upper levels of construction, however, we found no clear distinction between the masonry of the north and middle churches. In areas where the two buildings came together, the masonry was often found to be in a poor state or had been reconstructed, and evidence of the original connection was not found. Cleaning of the east façade in 2003 revealed a joint at ground level, which extends to just above the prothesis window of the middle church (fig. 24). The window, an afterthought, cuts into the masonry at the south-east corner of the north church, and the brick courses above it were anchored by a reused marble window frame. Above the level of the window arch, the brick courses are continuous and bonded between the north and middle churches; to either side of the window, the courses do not align. This indicates that after construction of the north church was well underway, it was determined to build the middle church, and the upper portions of the two were constructed simultaneously.

This chronology helps to explain several details in the interior. For example, the cornice of the middle

14 For our initial observations, see Ousterhout, Ahunbay, and Ahunbay, "Study and Restoration"; Ousterhout, "Contextualizing," esp. 248 and figs. 10–18; Ousterhout, "Interpreting."

church is set at the same height as the lower cornice of the north church, while those in the south church are considerably higher. In the eastern arch opening from the north to the middle church, the marble cornice extends uninterruptedly from one building to the next. In the areas where the north and middle churches meet, most of the masonry surfaces are still covered with plaster and have not yet been examined; nevertheless, it seems clear that the two churches were constructed simultaneously. Surviving evidence

of mosaic decoration also corresponds technically and stylistically between the two churches. In terms of architectural design, the middle church appears clearly as an afterthought, but the evidence of the masonry indicates uninterrupted construction.

The middle church was most likely begun as a single-domed space, but was modified during the process of construction. The unique, twin-domed design undoubtedly related to its double function, for it was divided between a liturgical space to the east and



FIG. 24 Same, east façade, joint between middle (left) and north (right) churches, at blocked window (June 2003)

the burial area to the west, as the *typikon* suggests.<sup>15</sup> Examination at the roof level indicates the large western dome was completed first, and then the smaller eastern dome was built against it, with some unfinished surfaces where the two join (see fig. 3). The forms of the two domes are distinct: the west dome has a ribbed inner surface (similar to the dome of the south church), whereas its eastern counterpart is a pumpkin dome (similar to the south gallery dome). Where they join, windows in the drums interconnect, but the sills and crowns are at different heights. Because the plan of the eastern bay was already determined, the east dome had to be constructed above an oblong bay, resulting in its unprecedented oval form. In its original design, this bay was most likely covered by a sail vault or saucer dome.

Other changes of design were effected during the construction of the exonarthex. Cleaning of the north façade of the exonarthex in 2004 clarified its construction history. It seems to have been designed as a lower space covered by a sloping wooden roof, which joined the narthex façade immediately below the south gallery windows (see fig. 14). Clear evidence of the original roofline is provided by the angled line of brick on the exterior, directly above the window arch. Corresponding breaks in the masonry have been observed on the lateral walls of the interior. Sometime during the construction of the exonarthex, the masons decided to increase the height and to vault the space throughout. It is unclear why this particular change was made, because it has resulted in a space that is lofty but dark, with windows positioned only in the lower walls. As vaulting was included, the external pilasters and arcades of the west façade were thickened to support the vaulting—as the joint on the north exonarthex façade indicates. The stepped pilasters and arches of the original narthex façade were simplified and strengthened, with marble cornices inserted to anchor the vaulting. The setbacks of the original arches were cut away to create angled and slightly concave surfaces in each.

The addition of the vaulted exonarthex motivated several other alterations. The most important of these was the addition of the gallery dome over the inner narthex of the south church. The evidence indicates

15 P. Gautier, "Le typikon du Christ Sauveur Pantocrator," *REB* 27 (1974): 81, lines 867–68: the east dome is called the "dome of the Incorporeal," whereas the western area is the "bema of the outside," being outside the bema.

that this was not part of the first phase, but that it was added only after the outer narthex was constructed. This change of design was clarified when the old concrete roof was removed and replaced in 2004 (fig. 11). The arcade of the central bay rises taller than the others, with its springing at a higher level. The pilasters to either side are quite broad, and the profiles of the central arcade are considerably simpler than the others, consisting of two setbacks where the others have four. At its impost, however, the details of the central arcade are considerably different and correspond to those of the other arcades. There the pilasters have multiple setbacks and preserve the springings of the original arcade, which was flattened and appears to have risen to the same height as the other façade arcades. Within the arcade are the setbacks for the original window openings.<sup>16</sup> Just above the springings, the arcade was cut and marble imposts were inserted to support the construction of a higher arch. Just above the extrados of the exonarthex vaults, a line of pink plaster is still preserved, which extends into the window reveals. Built against this are masonry additions that correspond to the window mullions of the new arcade.

When did the alteration of the central arcade occur? The surviving mullions stop above a level of unfinished masonry, which was never exposed on the façade and must have always been covered by a shed roof. This indicates that the modification happened only after the exonarthex was added—that is, when the unfinished area was already covered by the exonarthex roof. The motivation for the addition of yet another dome into an already complex building is not difficult to explain. The addition of the vaulted exonarthex eliminated almost all sources of natural light to the inner narthex, and the entrance into the katholikon became exceptionally dark. The gallery dome was added in combination with the removal of the vaulting above the central bay of the inner narthex, creating a light well at the entrance—a feature later imitated at the Kalenderhane Camii and at San Marco in Venice.<sup>17</sup>

16 For observations on this area before the old roof was removed and replaced, see Oosterhout, "Contextualizing."

17 Robert Oosterhout, "The Pantokrator Monastery and Architectural Interchanges in the Thirteenth Century," in *Quarta Crociata: Venezia—Bizanzio—Impero Latino*, eds. G. Ortalli, G. Ravagnani, and P. Schreiner (Venice, 2006), 2:749–69.

We have observed a number of additional, minor modifications to the complex. For example, the small window that opens from the gallery into the middle church, directly above the entrance, is a later addition, broken through the wall, with the arched opening crudely formed without voussoirs. The rough surfaces of the reveals were plastered and painted a dark blue. Similarly, when the middle church was added, a prothesis and diakonikon for it were roughly inserted, cut into the existing masonry and joined to the pastophoria of the adjacent buildings. Both of the middle church pastophoria were equipped with windows, roughly fitted into the east façade of the complex at the connections between the churches.

Finally, several interventions might be dated to the late Byzantine period. Modifications to the complex had already begun in the period of Manuel I, when the arch was opened between the south and middle churches to connect to his tomb. Following the restoration of Byzantine rule and the reconversion of the church to Orthodoxy in 1261, new templons seem to have been necessary. Templons were not standard features in Latin churches, and the old templons may have been removed during the Latin Occupation. That reconstructed by Megaw, incorporating panels from St. Polyeuktos, must belong to the late Byzantine restoration, as St. Polyeuktos stood intact until the thirteenth century.<sup>18</sup> In addition, ceramic roofing tiles of a late Byzantine type, found in the cleaning of the north church roof, may come from

a post-reconquest restoration.<sup>19</sup> The opening of the central arcade between the exonarthex and the south narthex may also represent a late Byzantine modification, as the masonry construction does not correspond to the twelfth-century masonry. Similarly, the barrel vault penetrations of the small windows inserted into the south crossarm of the north naos differ technically from the twelfth-century construction and may well be later. Within the apse of the north church, a bench was cut into the lower wall surface, discussed above, which may have been meant to introduce a synthronon into the late Byzantine church (see fig. 19).

The date of these later Byzantine modifications is unclear. They may date shortly after the restoration of Byzantine rule at the time of the departure of the Venetians from the monastery. The monastery figured into the politics of the late thirteenth century, and it seems to have provided a suitable setting for the tomb of the empress Eirene/Yolanda of Montferrat, who was buried there in 1317. Alternatively, some restoration may have occurred toward the very end of the Byzantine period, when the monastery was used again for imperial burials of Manuel II (1425) and members of his family. There is still much to sort out concerning the history of the building, which we hope will be unraveled with further investigations.

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18 Megaw, "Recent Work," 346 and fig. E; see also A.W. Epstein, "The Middle Byzantine Sanctuary Barrier: Temlon Screen or Iconostasis?" *Journal of the British Archaeological Association* 134 (1981): 1–28; Ousterhout, "Pantokrator Monastery," esp. 759.

19 Ousterhout, Ahunbay, and Ahunbay, "Study and Restoration," 268 and fig. 10.